

# Sciatic Injection Neuropathy

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■ *Prevention of sciatic injection neuropathy can best be accomplished by teaching that the injection should be made into the gluteal mass in the upper outer quadrant rather than the buttock, and that the needle should be introduced in a plane perpendicular to the surface of the bed when the patient is lying prone. Failing prevention, one must strive for early and correct diagnosis, especially in infants, and carry out exploration with internal and external neurolysis if there is no evidence of improvement within two to three months.*

THE PROBLEM OF SCIATIC nerve injury secondary to gluteal injection is a persistent one despite widespread teaching that the upper outer quadrant should be the site for injection, or that other sites should be used in children. It is difficult to restore a damaged nerve to normal function and the difficulty is compounded by the almost invariable medico-legal accompaniments.

Thus, the problem is two-fold—the education of personnel to avoid causing injection neuropathy, and prompt recognition, diagnosis and treatment if it does occur.

The typical sciatic injection neuropathy consists of severe involvement of the anterior compartment of the leg (anterior tibial, peronei, toe extensor muscles), usually with complete foot drop. There is usually weakness in the gastrocnemius muscle, although less pronounced than in the anterior compartment. Less frequently, there may be involvement of the hamstrings. The ankle jerk is usually absent and there is a variable sensory loss over the dorsum of the foot and lateral calf.

It is said that in 75 percent of cases there is immediate nerve damage without pain,<sup>1</sup> in 16 percent immediate nerve damage with pain in a

sciatic distribution, and in nine percent delayed paralysis without pain. These data are difficult to interpret because in most of the reports the patients were infants and pain therefore difficult to assess.

The question to answer is why do injection neuropathies continue to occur despite widespread teaching that the upper outer quadrant is the place for injection. It appears that most medical personnel responsible for gluteal injections believe that the safe site is the upper outer quadrant of the *buttock*, when indeed it is the upper outer quadrant of the *gluteal mass*,<sup>1</sup> a considerably larger target since it originates at the anterior superior iliac spine. In addition there is widespread impression that the needle angle should be vertical to the skin surface through which it is pushed, but Johnson and Raptau<sup>2</sup> showed in autopsy studies on infants that this will frequently result in injection of material into or near the sciatic nerve. They pointed out that if the needle is introduced in a plane vertical to the surface of the bed with the patient in the prone position, the nerve can almost invariably be avoided.

Besides needle length and direction, variation in thickness of the gluteal fat pad (from 1 to 9 cm, depending upon the age and state of nutri-

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tion of the patient) must be taken into account, for unless the fat is penetrated and the muscle reached, the purpose of the injection is defeated.

The clinical picture evolves because the needle usually approaches the nerve from the lateral aspect and the peroneal portion of the sciatic nerve is the more laterally placed of the two major divisions. In addition, the peroneal division is somewhat more superficial, and in 15 percent of cases,<sup>3</sup> it pierces the piriformis or leaves the pelvis above that muscle and thus is more vulnerable than the tibial component.

Virtually every injectable substance has been implicated in sciatic injection neuropathy, but the most frequent offenders are antibiotics, probably because they are used oftener and the buttock is usually the site chosen for injecting them. Whether injecting a material in the region of the sciatic nerve but not actually into the nerve can cause neuropathy is undecided. The separate investigations of Tarlov<sup>4</sup> and Hochstetter<sup>5,6</sup> in animals indicate that the offending material must be deposited within the nerve sheath to cause neuropathy.

The diagnosis of sciatic injection palsy is not always simple. Because it occurs more often in infants, the observation of foot drop may be considerably delayed. In addition, many patients receiving gluteal injections are quite sick and discovery may be delayed until they are convalescing. The following cases will illustrate some of the difficulties encountered. Once the diagnosis is confirmed, proper treatment can be instituted. During six to eight weeks of observation before neurosurgical intervention is undertaken, physical therapy should be given and a foot-drop brace provided. Consideration of stabilizing procedures or posterior tibial tendon transfers should be delayed until no hope remains for neurologic recovery. Should improvement begin, only further supportive measures are indicated.

Case 1. The patient, a 6-year-old girl, was given an injection in the left gluteal area for relief of pain after tonsillectomy. She had immediate local pain, and the following day weakness was noted with numbness in the left foot. She had considerable pain at night and was found to have weakness in the gluteal muscles, the hamstrings and in the anterior and posterior leg muscles. She had numbness on the dorsal foot and lateral calf. The left ankle jerk was absent.

On examination three weeks after the injection definite improvement was noted and in three months recovery was complete.

This case is an example of spontaneous improvement; only physical therapy was needed to assist in recovery. However, if the patient does not improve in six to eight weeks as judged by either electromyographic or clinical testing, then neurolysis should be carried out. This should include exposure of the sciatic nerve through a question mark-shaped incision with reflection of the gluteus maximus medially. Both internal and external neurolysis must be performed, and intraoperative electrical stimulation before and after the neurolysis, both proximal and distal to the lesion, is helpful in determining prognosis.

Case 2. A 9-year-old boy had an electrical sensation immediately after a penicillin injection in the left buttock. Numbness and weakness also were noted immediately. Treatment was expectant. Four months after the injection, there was complete foot drop and weakness of plantar flexion of the foot as well. Ankle jerk was diminished and the calf was atrophic. There was numbness in the anterolateral calf and dorsal foot. Internal neurolysis was carried out with the aid of magnification, to relieve the dense intraneural scarring. Slow recovery ensued. A year and a half after operation the patient had discarded his foot-drop brace and was engaging in all of his normal activities despite residual weakness in his toe extensors.

Case 3. A 3-year-old girl received an injection of penicillin and hydroxysine hydrochloride (Vistaril®) in the right gluteal area before tonsillectomy. After the operation, right foot drop was noted. On subsequent examination the circumference of the right calf was 3 cm less than the left, and there was complete paralysis of the anterior leg muscles and moderate to pronounced weakness of the gastrocnemius group and the toe flexors. Hyperesthesia was noted in the dorsum of the foot. The right ankle jerk was absent. Four months after the injury there was no improvement and electromyography showed fibrillations in both the anterior and posterior leg muscles without involvement of the hamstrings or gluteal muscles. Sciatic internal neurolysis was carried out. The lesion was at the level of the sciatic notch, as is usually the case. There was pronounced internal scarring of the nerve, more pronounced in the peroneal than in the tib-

ial portion. Despite the poor condition of the nerve, there was some intraoperative improvement to electrical stimulation after neurolysis. Two days later the patient could move the extensors of her foot and subsequently she had complete recovery. Eight months after operation the only discernible changes were a 3 mm decrease in the size of the right calf, and the operative scar.

Case 4. A 21-year-old woman took an overdose of sleeping pills and was found unconscious by her friends who tried to awaken her by a gluteal injection of "speed." Soon afterward she was aware of numbness and weakness in the left lower extremity. On examination four months after the injection, mild weakness of the hamstrings, pronounced weakness of the gastrocnemius and soleus, and slight weakness in the anterior leg muscles were noted. There was atrophy of the calf. Sensation in the sole and lateral foot was decreased and the Achilles reflex was absent. Internal neurolysis of severe scarring in the tibial division of the sciatic nerve was carried out. Within ten days there was improvement in plantar flexion. A year and a half later muscle strength was normal but there was still diminished sensation on the ball of the foot and absence of ankle jerk. The patient was able to use the left lower extremity in normal fashion, however.

Case 5. A 50-year-old man received an intragluteal injection of penicillin for a cold. He had immediate pain in the buttock and two days later, when he got up from bed, noted pain extending into the right lower extremity. The pain increased on activity and was relieved by rest. There was tenderness in the sciatic notch, and the right ankle jerk was absent. The attending physician made a diagnosis of injection neuropathy, as did several who examined the patient subsequently. Ultimately, a sciatic nerve exploration was carried out and no abnormality of the nerve was observed. A myelogram showed significant defects at the fourth and fifth lumbar disc levels on the symptomatic side. Questioning elicited a history of previous disc operation on the left and two previous episodes of sciatica on the right.

## Discussion

Our experience, as illustrated by cases herein reported, indicates that surgical intervention can improve the prognosis of sciatic injection palsy. Review of the literature also supports a role for surgical intervention. Arrest of growth of the foot occurs in about half of infants with sciatic palsy; a "satisfactory improvement" is achieved in only about one-third<sup>7</sup> of untreated cases. Many patients require a foot brace permanently. More, the longer surgical intervention is put off, the greater the likelihood of permanent changes in muscles, joints and skin. Such changes will not be reversed by good surgical treatment if it is too long delayed.

Unquestionably, the diagnosis of injection palsy in Case 5 was incorrect. The patient had a protruded lumbar disc with root compression. The early diagnostic errors resulted in litigation and pecuniary award, however, even though the diagnosis was not supported by the findings, the history, or the studies. When the sciatic nerve is injected, any pain that occurs is usually immediate and throughout the lower extremity. It is not related to activity, and indeed is frequently worse at night. In such cases weakness and sensory loss are usually most severe in the peroneal distribution. Electromyography is frequently helpful in corroborating the diagnosis.

## TRADE AND GENERIC NAMES OF DRUGS

Vistaril® .....hydroxysine hydrochloride

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